

# U.S. FISH AND WILDLIFE SERVICE SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

**Scientific Name:**

*Pseudanophthalmus colemanensis*

**Common Name:**

Coleman Cave beetle

**Lead region:**

Region 4 (Southeast Region)

**Information current as of:**

04/19/2013

**Status/Action**

☐ Funding provided for a proposed rule. Assessment not updated.

☐ Species Assessment - determined species did not meet the definition of the endangered or threatened under the Act and, therefore, was not elevated to the Candidate status.

☐ New Candidate

☒ Continuing Candidate

☐ Candidate Removal

☐ Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status

☐ Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species

☐ Range is no longer a U.S. territory

☐ Insufficient information exists on biological vulnerability and threats to support listing

☐ Taxon mistakenly included in past notice of review

☐ Taxon does not meet the definition of "species"

☐ Taxon believed to be extinct

☐ Conservation efforts have removed or reduced threats

\_\_\_ More abundant than believed, diminished threats, or threats eliminated.

## **Petition Information**

\_\_\_ Non-Petitioned

X Petitioned - Date petition received: 04/20/2010

90-Day Positive:09/27/2011

12 Month Positive:10/26/2011

Did the Petition request a reclassification? **No**

### **For Petitioned Candidate species:**

Is the listing warranted(if yes, see summary threats below) **Yes**

To Date, has publication of the proposal to list been precluded by other higher priority listing?  
**Yes**

Explanation of why precluded:

We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, for the preceding 12 months, and continues to be, precluded by higher priority listing actions (including candidate species with lower LPNs). During the past 12 months, the majority of our entire national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements; meeting statutory deadlines for petition findings or listing determinations; emergency listing evaluations and determinations; and essential litigation-related administrative and program management tasks. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken over the past 12 months, see the discussion of Progress on Revising the Lists, in the current CNOR which can be viewed on our Internet website (<http://endangered.fws.gov/>).

## **Historical States/Territories/Countries of Occurrence:**

- **States/US Territories:** Tennessee
- **US Counties:** Montgomery, TN
- **Countries:**Country information not available

## **Current States/Counties/Territories/Countries of Occurrence:**

- **States/US Territories:** Tennessee
- **US Counties:** Montgomery, TN
- **Countries:**Country information not available

## **Land Ownership:**

*Pseudanophthalmus colemanensis*, the Coleman Cave beetle, was described by Barr (1959, pages 5-30) based upon a few specimens he collected in 1957 from Coleman Cave, Montgomery County, Tennessee. During a

1999 visit to the cave, one specimen was observed by Barr and others (Barr 2001, page 5). Until 2004, this was the only known site for the species. A new location for the species was discovered in 2004 by David Withers, Tennessee Department of Conservation, during a biological inventory of Foster Cave. One specimen of the species was found during that survey. Foster Cave (also called Darnell Cave and Cooper Creek Cave) is on a preserve owned and managed by the Tennessee Department of Conservation. In 2006, H. Garland, The Nature Conservancy, discovered a specimen of this species in Bellamy Cave and J. Lewis, conducting cave invertebrate surveys in Tennessee in cooperation with The Nature Conservancy, discovered it in Darnell Spring Cave. Darnell Spring Cave was recently found to be connected to the cave system known as Foster Cave, Darnell Cave, and Cooper Creek Cave. The species is now represented by a few specimens each from Bellamy and Foster Caves (Barr pers. comm. 2010). All of these sites are in close proximity to each other. Bellamy Cave is owned and managed by the Tennessee Wildlife Resources Agency (TWRA). Both Foster Cave and Bellamy Cave were first acquired and protected by The Nature Conservancy and later transferred to the state for long-term protection and management.

### **Lead Region Contact:**

ARD-ECOL SVCS, Erin Rivenbark, 706 613-9493, [erin\\_rivenbark@fws.gov](mailto:erin_rivenbark@fws.gov)

### **Lead Field Office Contact:**

TENNESSEE ESFO, David Pelren, 931 528 6481, [david\\_pelren@fws.gov](mailto:david_pelren@fws.gov)

## **Biological Information**

### **Species Description:**

The insect genus *Pseudanophthalmus* is in the predatory ground beetle family Carabidae. Most members of this genus are cave dependent (troglobites) and are not found outside the cave environment. Barr (1996, page 3) states that there are approximately 255 species in the genus *Pseudanophthalmus*. All are predatory and feed upon small cave invertebrates such as spiders, mites, millipedes, and diplurans, while the larger *Pseudanophthalmus* species also feed on cave cricket eggs (Barr 1996, page 6). Members of this genus vary in rarity from fairly common, widespread species that are found in many caves to species that are extremely rare and restricted to only one cave or, at most, two caves. Cave beetles in the genus *Pseudanophthalmus* are fairly small, eyeless, reddish-brown insects. Like most other insects, they have six legs and a body that consists of a head, thorax, and abdomen. Body length is generally from 3.0 to 8.0 millimeters (mm) (0.12 to 0.32 inches), depending upon the species. The different species within the genus are differentiated by differences in the shape and size of the various body parts, especially the shape of the male appendages used during reproduction.

Minimum detailed life history information is available for the rarest of the cave beetles that are considered here, but the generalized summary that follows is accurate for the more common and more easily studied species and is believed to also apply to the rarer species (Barr 1998, page 3). Cave beetles copulate in the fall, and the eggs are deposited in the cave soil during late fall. The eggs hatch and larvae appear in late fall through early winter. Pupation occurs in late winter to early summer with the adult beetles emerging in early summer (Barr 1996, page 5).

The limestone caves in which these cave beetles are found provide a unique and fragile environment that supports a variety of species that have evolved to survive and reproduce under the demanding conditions found in cave ecosystems. No photosynthesis takes place within the dark zone of a cave. Therefore, all organisms that are adapted to life within a cave are dependent upon energy from the surface. This energy can be in the form of leaf litter, woody debris or small bits of organic matter that is washed or falls into the cave,

or guano deposited by cave-dependent bats that feed on the surface and return to the cave to roost (Barr 1996, pages 6, 7).

## **Taxonomy:**

*Pseudanophthalmus colemanensis*, the Coleman Cave beetle, was described by Barr (1959, pages 5-30) based upon a few specimens he collected in 1957 from Coleman Cave, Montgomery County, Tennessee.

## **Habitat/Life History:**

The insect genus *Pseudanophthalmus* is in the predatory ground beetle family Carabidae. Most members of this genus are cave dependent (troglobites) and are not found outside the cave environment. Barr (1996, page 3) states that there are approximately 255 species in the genus *Pseudanophthalmus*. All are predatory and feed upon small cave invertebrates such as spiders, mites, millipedes, and diplurans, while the larger *Pseudanophthalmus* species also feed on cave cricket eggs (Barr 1996, page 6). Members of this genus vary in rarity from fairly common, widespread species that are found in many caves to species that are extremely rare and restricted to only one cave or, at most, two caves. Cave beetles in the genus *Pseudanophthalmus* are fairly small, eyeless, reddish-brown insects. Like most other insects, they have six legs and a body that consists of a head, thorax, and abdomen. Body length is generally from 3.0 to 8.0 millimeters (mm) (0.12 to 0.32 inches), depending upon the species. The different species within the genus are differentiated by differences in the shape and size of the various body parts, especially the shape of the male appendages used during reproduction.

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## **Historical Range/Distribution:**

*Pseudanophthalmus colemanensis*, the Coleman Cave beetle, was described by Barr (1959, pages 5-30) based upon a few specimens he collected in 1957 from Coleman Cave, Montgomery County, Tennessee. During a 1999 visit to the cave, one specimen was observed by Barr and others (Barr 2001, page 5). Until 2004, this was the only known site for the species. A new location for the species was discovered in 2004 by David Withers, Tennessee Department of Conservation, during a biological inventory of Foster Cave. One specimen of the species was found during that survey. Foster Cave (also called Darnell Cave and Cooper Creek Cave) is on a preserve owned and managed by the Tennessee Department of Conservation. In 2006, H. Garland, The Nature Conservancy, discovered a specimen of this species in Bellamy Cave and J. Lewis, conducting cave invertebrate surveys in Tennessee in cooperation with The Nature Conservancy, discovered it in Darnell Spring Cave. Darnell Spring Cave was recently found to be connected to the cave system known as Foster Cave, Darnell Cave, and Cooper Creek Cave.

## **Current Range Distribution:**

*Pseudanophthalmus colemanensis*, the Coleman Cave beetle, was described by Barr (1959, pages 5-30) based upon a few specimens he collected in 1957 from Coleman Cave, Montgomery County, Tennessee. During a 1999 visit to the cave, one specimen was observed by Barr and others (Barr 2001, page 5). Until 2004, this was the only known site for the species. A new location for the species was discovered in 2004 by David Withers, Tennessee Department of Conservation, during a biological inventory of Foster Cave. One specimen of the species was found during that survey. Foster Cave (also called Darnell Cave and Cooper Creek Cave) is on a preserve owned and managed by the Tennessee Department of Conservation. In 2006, H. Garland, The Nature Conservancy, discovered a specimen of this species in Bellamy Cave and J. Lewis, conducting cave invertebrate surveys in Tennessee in cooperation with The Nature Conservancy, discovered it in Darnell Spring Cave. Darnell Spring Cave was recently found to be connected to the cave system known as Foster Cave, Darnell Cave, and Cooper Creek Cave. The species is now represented by a few specimens each from Bellamy and Foster Caves (Barr pers. comm. 2010). All of these sites are in close proximity to each other.

## **Population Estimates/Status:**

No populations estimates are currently available for this species.

## **Distinct Population Segment(DPS):**

N/A

## **Threats**

### **A. The present or threatened destruction, modification, or curtailment of its habitat or range:**

This species is limited in distribution among a few caves that are in close proximity to each other, making this species vulnerable to isolated events that would only have a minimal effect on the more wide-ranging members of the genus. Events such as toxic chemical spills, discharges of large amounts of polluted water, closure of entrances, alteration of entrances, or the creation of new entrances can have serious adverse impacts on this cave beetle and could result in its extinction (Barr 1996, page 9, 10).

Caves and the species that are completely dependent upon them (troglobites) receive the energy that forms the basis of the cave food chain from outside the cave. This energy can be in the form of bat guano deposited by cave-dependent bats, large or small woody debris washed or blown into the cave, or tiny bits of organic matter that is carried into the cave by water through small cracks in the rocks overlaying the cave (Barr 1996; page 6, 7).

Activities such as industrial, residential, commercial, or highway construction can, if not planned in a manner to protect caves, directly destroy caves or result in severe modification of the natural processes that maintain the sensitive biological systems they support. Examples of these types of threats can be seen with two current candidates (*P. caecus*, the Clifton Cave beetle; and *P. troglodytes*, the Louisville cave beetle), which have both had one of their two known caves destroyed due to construction-related activities. Pollution and chemical contamination can, under certain circumstances, result in the complete destruction of the unique life found within a cave impacted by these factors. Vandalism has affected this beetle's occupied caves, and the species is vulnerable to trash dumping activities. Loss or reduction of the supply of energy can result in the loss or severe reduction of cave beetle populations (Barr 1996, pages 16, 17).

Guano deposited in caves by cave dependent bats, such as the endangered gray bat, often forms the basis of the food chain within a cave. As noted above, higher trophic level species, like predatory cave species, are indirectly dependent upon outside sources of organic matter such as bat guano. Impacts upon these energy

sources could negatively affect this beetle. In 1957, Coleman Cave supported an endangered gray bat maternity colony. Either because of human disturbance of the colony during the maternity season or because of changes in cave microclimate caused by the closure of an upper level entrance to the cave, Coleman Cave no longer supports a maternity colony. The Nature Conservancy has developed a Cooperative Management Agreement with the owner of this cave and has taken active steps to protect the site from human disturbance. This action should reduce human disturbance at the cave and should benefit the gray bat. However, the blocked upper entrance to the cave may have changed cave temperatures and moisture levels in a manner that makes the site unsuitable for gray bat use. It may be necessary to restore this upper entrance so that Coleman Cave will once again support a gray bat maternity colony. Until a dependable source of organic matter is provided to the Coleman Cave beetle population, either by reestablishment of the gray bat colony or from some other sources, this species is vulnerable to extinction.

Dependence upon the surface makes caves and the biota that is found within them vulnerable to actions that take place well outside and away from the cave. Protection of caves and cave dependent species must include both the physical environment in which the species are found and the surface components that provide the energy and clean water needed for survival.

## **B. Overutilization for commercial, recreational, scientific, or educational purposes:**

This cave beetle species is known to occur at a rather limited number of locations. Most cave beetle populations are extremely small; and careless collecting, whether for scientific or other purposes, could adversely affect them. These species have no known commercial value; however, the caves in which these species occur may be used for recreational purposes by explorers and other recreationists.

## **C. Disease or predation:**

Disease or predation is not known to be a significant problem for this species. However, since it appears to exist with low numbers of individuals, mortality via either of these two factors may have a significant, negative impact on recruitment and long-term survival.

## **D. The inadequacy of existing regulatory mechanisms:**

This species does not receive any official State or Federal protection.

## **E. Other natural or manmade factors affecting its continued existence:**

As noted above, guano often forms the basis of the food chain in cave ecosystems. With the spread of white-nose syndrome into bat populations in Tennessee, documented during 2010, it is likely that populations of cave-hibernating bats will experience drastic declines in coming years. If such declines are observed, this could disrupt the trophic system in affected caves and cause cascading effects on populations of invertebrates that are dependent on bats for transferring sources of energy from the outside world to the subterranean environment. We cannot predict the rate of spread of white-nose syndrome in Tennessee and the potential effects upon bat populations where these cave beetles occur, thus we do not consider this threat imminent at this time.

## **Conservation Measures Planned or Implemented :**

In 1989 the Service developed a Volunteer Service Agreement with Richard Wallace, Knoxville, Tennessee, to conduct surveys for six rare cave beetles found in Eastern Tennessee and adjacent portions of Southwestern Virginia. Nobletts Cave beetle was one of the beetles examined by Mr. Wallace (Wallace 1989, page 5). Based upon the information provided in this report, the Service sent formal notification (July 1990) of a status review of five of these species to 51 individuals or organizations. Two letters were received in

response to our notice. One was from the Tennessee Valley Authority's Natural Heritage Program stating that they had no new information on these species and the other was from Dr. Thomas Barr stating that there were at least 50 beetles within the genus *Pseudanophthalmus* that needed to be included in the status review. In response to this information the Service, in cooperation with Kentucky Department of Fish and Wildlife Resources (KDFWR), funded a survey of 21 cave beetles. After completion of the surveys in Kentucky, the Service, in cooperation with TWRA, funded a status survey for 27 rare cave beetles that occur in Tennessee or adjacent portions of Alabama or Georgia. Dr. Barr provided a final report on the Kentucky species in 1996 and a final report for the Tennessee project in 2001. In 1999, nine of the beetles included in the Kentucky report were elevated to candidate status.

While gathering the land ownership information needed for the final reports on these cooperatively funded projects (Barr 1996, pages 11-55; 1998, pages 4-10 and 2001, pages 5-32), the landowners, when they could be contacted, were made aware of the presence of the rare cave beetles within caves on their land. Most owners were pleased to learn of the presence of a rare species within their caves and are expected to be willing to assist with any protection activities needed to protect and recover these cave beetles. The KDFWR and TWRA both actively participated in gathering the information presented in Barr (1996, page 60, 1998; page 1, and 2001, page 1) on the status of these species. It is anticipated that they will continue to support and participate in rare cave beetle protection. In 2001, the owners of Coleman Cave, The Nature Conservancy, TWRA, the Service and others entered into a Cooperative Management Agreement for the cave. Foster Cave was purchased by The Nature Conservancy and is currently owned by the Tennessee Department of Conservation. Property that included the main entrance to Bellamy Cave was also purchased by The Nature Conservancy; ownership has now been transferred to the TWRA for long-term management and protection. Sheals Cave is currently protected by the landowners from any physical alterations that could adversely affect the species; and in 2005, the landowners entered into a Cooperative Management Agreement for the cave with The Nature Conservancy, TWRA, and the Service.

## **Summary of Threats :**

All of these cave beetles are currently known from only one to four caves, depending on the species. Their limited distributions make these species vulnerable to isolated events that would only have a minimal effect on the more wide-ranging members of the genus. Events such as toxic chemical spills, discharges of large amounts of polluted water, closure of entrances, alteration of entrances, or the creation of new entrances can have serious adverse impacts on these cave beetles and could result in their extinction. With the discovery of white-nose syndrome in bat populations in Tennessee, it is likely that populations of cave-hibernating bats will suffer drastic declines, disrupting food chains dependent upon guano deposition as a source of energy input from the outside world. We find that these species are warranted for listing throughout their entire geographic ranges, and, therefore, find that it is unnecessary to analyze whether they are threatened or endangered in a significant portion of their ranges.

## **For species that are being removed from candidate status:**

\_\_\_\_\_ Is the removal based in whole or in part on one or more individual conservation efforts that you determined met the standards in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE)?

## **Recommended Conservation Measures :**

Maintain/establish landowner contact. Establish/maintain conservation agreements or memoranda of understanding to ensure appropriate management of caves supporting these species. Construct gates or other appropriate barriers to control human access when necessary. Monitor population levels annually and search for additional populations. Monitor existing threats to these species and to the caves that support them. Develop and implement plans to reduce or eliminate direct and indirect threats to these species. Continue annual review of the status of these species.

## Priority Table

Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2
		Subspecies/Population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/Population	6
Moderate to Low	Imminent	Monotype genus	7
		Species	8
		Subspecies/Population	9
	Non-imminent	Monotypic genus	10
		<b>Species</b>	<b>11</b>
		Subspecies/Population	12

### Rationale for Change in Listing Priority Number:

N/A

### Magnitude:

All of Tennessee's cave beetle candidate species are currently known from only one to three caves. Their limited distributions make these species vulnerable to isolated events that would only have a minimal effect on the more wide-ranging members of the genus. Events such as toxic chemical spills, discharges of large amounts of polluted water, closure of entrances, alteration of entrances, or the creation of new entrances can have serious adverse impacts on these cave beetles and could result in their extinction. No formal protection is currently provided to three of these six cave beetles, and the magnitude of the threats they face is high. Coleman Cave beetle currently receives some protection under a formal Cooperative Management Agreement for Coleman Cave and state ownership of Foster Cave and Bellamy Cave; consequently, the threats it faces are more moderate.

### Imminence :

The threats faced by this species are significant; however, it is not anticipated that it will be subject to these threats in the immediate future (next 1-2 years).

  Yes   Have you promptly reviewed all of the information received regarding the species for the purpose of determination whether emergency listing is needed?

### Emergency Listing Review

  No   Is Emergency Listing Warranted?

Given the current status and the magnitude and imminence of the threats to these species, emergency listing is not warranted at this time.



## **Description of Monitoring:**

The Nature Conservancy (TNC) occasionally monitors the sites for which they have obtained Cooperative Management Agreements and the site they currently own. This monitoring of Foster Cave, which is part of a preserve established for other species, revealed the presence of a previously unknown population of the Colemans Cave beetle. TNC has developed the Tennessee Cave Initiative with TWRA and others to identify and protect sites that support federally listed, candidate and special concern cave dependent species. As a part of this initiative, they have regularly monitored the sites that support these cave beetles and work to gain long term protection for them. In this monitoring effort, TNC has worked cooperatively with Dr. Jerry Lewis, who conducts systematic surveys of Tennessee cave invertebrates (Lewis and Lewis 2007, pages 1-42). Although this monitoring has been curtailed to some degree because of white-nose syndrome surveillance, TNC staff intend to continue the monitoring of cave invertebrates.

## **Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment:**

Tennessee

## **Indicate which State(s) did not provide any information or comment:**

none

## **State Coordination:**

The candidate cave beetles in Tennessee are included in the state's Wildlife Action Plan as Tier 2 species (Tennessee Wildlife Resources Agency 2005). Tier 2 species are of concern but no State agency has management responsibility for them.

## **Literature Cited:**

- Barr, Thomas C. 1959. New cave beetles (Carabidae, Trechini) from Tennessee and Kentucky. *Journal Tennessee Academy of Science* 34:5-30.
- Barr, Thomas C. 1980. New species groups of *Pseudanophthalmus* from the Central Basin of Tennessee (Coleoptera: Carabidae: Trechini). *Brimleyana* (3): 85-96.
- Barr, Thomas C. 1981. *Pseudanophthalmus* from Appalachian Caves (Coleoptera: Carabidae): The Engelhardt Complex. *Brimleyana* 5: 37-94.
- Barr, Thomas C. 1993. Letter to Robert Currie, US Fish and Wildlife Service, Asheville, NC March 22, 1993.
- Barr, Thomas C., 1996. Cave Beetle Status Survey and Prelisting Recovery Project. Unpublished Report to Kentucky Department of Fish and Wildlife Resources, Frankfort, Kentucky, and the U.S. Fish and Wildlife Service, Asheville, North Carolina. 63 pp.
- Barr, Thomas C. 1998. Study of Potentially Threatened or Endangered Species of Cave Beetles in Tennessee, Alabama and Georgia. Interim Progress Report to the Tennessee Wildlife Resources Commission. 11 pp.
- Barr, Thomas C. 2001. Cave Beetles in Tennessee, Alabama and Georgia, Potentially Threatened or Endangered Species of *Pseudanophthalmus* (Coleoptera: Carabidae). Final Report to U.S. DOI, Office of Endangered Species, and the Tennessee Wildlife Resources. 36 pp.

Barr, Thomas C. 2009. Personal Communication to Robert Currie, US Fish and Wildlife Service, Asheville, NC January 23, 2009.

Barr, Thomas C. 2010. Email to Geoff Call, US Fish and Wildlife Service, Cookeville, Tennessee. March 3, 2010.

Lewis, Julian J. and Salisa L. Lewis. 2007. A Biological Reconnaissance of Selected Caves in the Highland Rim Area of Central Tennessee. Lewis & Associates, LLC, Cave, Karst & Groundwater Biological Consulting, Borden, IN. Final Report to The Nature Conservancy, Nashville, TN. 42 pp.

Tennessee Wildlife Resource Agency. 2005. Tennessee's Comprehensive Wildlife Conservation Strategy. TWRA. Nashville, Tennessee.

Wallace, Richard L. 1989. Report on a Carabid Beetle Survey. Unpublished report to the U.S. Fish and Wildlife Service, Asheville, NC. 6 pp.

### **Approval/Concurrence:**

Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve:



07/15/2013

Date

Concur:



10/28/2013

Date

Did not concur:

\_\_\_\_\_

\_\_\_\_\_  
Date

Director's Remarks: